

What is claimed is:

1. A method of manufacturing a semiconductor device comprising:

5 a first step of depositing a first film and a second film on a conductive layer in this order and etching a desired portion of the second film with a first etching gas until the first film is exposed, the first film being made of one of a silicon

10 nitride film and a silicon nitride oxide film, the second film being made of a silicon oxide film;

a second step of removing a reaction product deposited on the first film through the first step with a second etching gas to expose the first film;

15 a third step of etching the first film exposed through the second step with a third etching gas until the conductive layer is exposed; and

a fourth step of removing a reaction product deposited on the conductive layer through the third step with a fourth etching gas, thereby forming a concave portion penetrating the
20 first and second films to reach the conductive layer surface.

2. A method according to claim 1, wherein the first, second, third and fourth steps are successively carried out in a single apparatus maintaining therein a vacuum state.

3. A method according to claim 1, wherein the first etching gas contains at least one of CHF_3 , C_4F_8 and C_5F_8 .

4. A method according to claim 1, wherein the third
5 etching gas contains at least one of CHF_3 and CH_2F_2 .

5. A method according to claim 1, wherein the second
and fourth etching gases contain O_2 and the etching in the
second and fourth steps is carried out under plasma
10 conditions.

6. A method according to claim 1, wherein the conductive
layer is a silicon substrate and the concave portion is a contact
hole.

15 7. A method according to claim 1, wherein the conductive
layer is a layered substrate on which an electrode is layered
and the concave portion is a via hole.